



ENVIRONMENTAL PROTECTION AGENCY

[FRL--10004-93-OAR]

Alternative Methods for Calculating Off-cycle Credits under the Light-duty Vehicle Greenhouse Gas Emissions Program: Applications from Ford Motor Company, American Honda Motor Company, and Nissan North America, Inc.

AGENCY: Environmental Protection Agency (EPA).

ACTION: Notice.

SUMMARY: EPA is requesting comment on applications from Ford Motor Company (“Ford”), Honda Motor Company (“Honda”), and Nissan North America, Inc. (Nissan) for off-cycle carbon dioxide (CO₂) credits under EPA’s light-duty vehicle greenhouse gas emissions standards. “Off-cycle” emission reductions can be achieved by employing technologies that result in real-world benefits, but where that benefit is not adequately captured on the test procedures used by manufacturers to demonstrate compliance with emission standards. EPA’s light-duty vehicle greenhouse gas program acknowledges these benefits by giving automobile manufacturers several options for generating “off-cycle” CO₂ credits. Under the regulations, a manufacturer may apply for CO₂ credits for off-cycle technologies that result in off-cycle benefits. In these cases, a manufacturer must provide EPA with a proposed methodology for determining the real-world off-cycle benefit. Ford, Honda, and Nissan have submitted applications that describe methodologies for determining off-cycle credits from technologies described in their applications. Pursuant to applicable regulations, EPA is making these off-cycle credit calculation methodologies available for public comment.

DATES: Comments must be received on or before [insert date 30 days after date of publication in the Federal Register].

ADDRESSES: Submit your comments, identified by Docket ID No. EPA–HQ– OAR– 2020–0015, to the Federal eRulemaking Portal: <http://www.regulations.gov>. Follow the online instructions for submitting comments. Once submitted, comments cannot be edited or withdrawn. The EPA may publish any comment received to its public docket. Do not submit electronically any information you consider to be Confidential Business Information (CBI) or other information whose disclosure is restricted by statute. Multimedia submissions (audio, video, etc.) must be accompanied by a written comment. The written comment is considered the official comment and should include discussion of all points you wish to make. The EPA will generally not consider comments or comment contents located outside of the primary submission (i.e. on the web, cloud, or other file sharing system). For additional submission methods, the full EPA public comment policy, information about CBI or multimedia submissions, and general guidance on making effective comments, please visit <http://www2.epa.gov/dockets/commenting-epa-dockets>.

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SUPPLEMENTARY INFORMATION:

I. Background

EPA's light-duty vehicle greenhouse gas (GHG) program provides three pathways by which a manufacturer may accrue off-cycle carbon dioxide (CO₂) credits for those technologies that achieve CO₂ reductions in the real world but where those reductions are not adequately captured on the test used to determine compliance with the CO₂ standards, and which are not otherwise reflected in the standards' stringency. The first pathway is a predetermined list of credit values for specific off-cycle technologies that may be used beginning in model year 2014.¹ This pathway allows manufacturers to use conservative credit values established by EPA for a wide range of technologies, with minimal data submittal or testing requirements, if the technologies meet EPA regulatory definitions. In cases where the off-cycle technology is not on the menu but additional laboratory testing can demonstrate emission benefits, a second pathway allows manufacturers to use a broader array of emission tests (known as "5-cycle" testing because the methodology uses five different testing procedures) to demonstrate and justify off-cycle CO₂ credits.² The additional emission tests allow emission benefits to be demonstrated over some elements of real-world driving not adequately captured by the GHG compliance tests, including high speeds, hard accelerations, and cold temperatures. These first two methodologies were completely defined through notice and comment rulemaking and therefore no additional process is necessary for manufacturers to use

¹ See 40 CFR 86.1869-12(b).

² See 40 CFR 86.1869-12(c).

these methods. The third and last pathway allows manufacturers to seek EPA approval to use an alternative methodology for determining the off-cycle CO₂ credits.³ This option is only available if the benefit of the technology cannot be adequately demonstrated using the 5-cycle methodology. Manufacturers may also use this option to demonstrate reductions that exceed those available via use of the predetermined list.

Under the regulations, a manufacturer seeking to demonstrate off-cycle credits with an alternative methodology (i.e., under the third pathway described above) must describe a methodology that meets the following criteria:

- Use modeling, on-road testing, on-road data collection, or other approved analytical or engineering methods;
- Be robust, verifiable, and capable of demonstrating the real-world emissions benefit with strong statistical significance;
- Result in a demonstration of baseline and controlled emissions over a wide range of driving conditions and number of vehicles such that issues of data uncertainty are minimized;
- Result in data on a model type basis unless the manufacturer demonstrates that another basis is appropriate and adequate.

Further, the regulations specify the following requirements regarding an application for off-cycle CO₂ credits:

- A manufacturer requesting off-cycle credits must develop a methodology for demonstrating and determining the benefit of the off-cycle technology

³ See 40 CFR 86.1869-12(d).

and carry out any necessary testing and analysis required to support that methodology.

- A manufacturer requesting off-cycle credits must conduct testing and/or prepare engineering analyses that demonstrate the in-use durability of the technology for the full useful life of the vehicle.
- The application must contain a detailed description of the off-cycle technology and how it functions to reduce CO₂ emissions under conditions not represented on the compliance tests.
- The application must contain a list of the vehicle model(s) which will be equipped with the technology.
- The application must contain a detailed description of the test vehicles selected and an engineering analysis that supports the selection of those vehicles for testing.
- The application must contain all testing and/or simulation data required under the regulations, plus any other data the manufacturer has considered in the analysis.

Finally, the alternative methodology must be approved by EPA prior to the manufacturer using it to generate credits. As part of the review process defined by regulation, the alternative methodology submitted to EPA for consideration must be made available for public comment.⁴ EPA will consider public comments as part of its final decision to approve or deny the request for off-cycle credits.

II. Off-Cycle Credit Applications

A. Valeo Air Conditioning Compressor with Variable Bleed Valve

Using the alternative methodology approach discussed above, Ford is applying for credits for an air conditioning compressor manufactured by Valeo that results in air conditioning efficiency credits beyond those provided in the regulations. Valeo's air conditioning compressor with variable bleed valve improves energy consumption compared to the current generation compressor technology. Current technology is a compromise of all load conditions. The variable bleed valve improves the coefficient of performance under low and mid load conditions decreasing CO₂ emissions. The variable bleed valve is designed to vary the bleed valve diameter, making it smaller to control internal control gas for improved coefficient of performance, but also be able to increase for liquid start up conditions. The optimized valves reduce losses within the A/C compressor increasing efficiency. The additional variable bleed valve improves the compressor over previous externally-controlled variable displacement compressor designs.

⁴ See 40 CFR 86.1869-12(d)(2).

The credits calculated for the Valeo air conditioning compressor with variable bleed valve would be in addition to the credits of 1.7 grams/mile for variable-displacement A/C compressors already allowed under EPA regulations.⁵ However, it is important to note that EPA regulations place a limit on the cumulative credits that can be claimed for improving the efficiency of A/C systems, and EPA has typically required that A/C-related technologies for which credits are sought through the off-cycle program must also comply with these limits. The rationale for the limits is that the additional fuel consumption of A/C systems can never be reduced to zero, and the limits established by regulation reflect the maximum possible reduction in fuel consumption projected by EPA for a typical A/C system. To date, EPA has required that these limits, or caps, on credits for A/C efficiency be applied to A/C efficiency credits granted under the off-cycle credit approval process. In other words, EPA has required that cumulative A/C efficiency credits for an A/C system – from the A/C efficiency regulations and those granted via the off-cycle regulations –comply with the stated limits.

The Ford application contains a detailed analysis supporting their conclusion that the variable bleed valve is complementary to other A/C efficiency technologies and, as such, should not be limited by the cap. However, the fundamental approach of the A/C efficiency improvement program is premised on limits to the overall impact of the A/C system on CO₂ and fuel economy, and EPA therefore established caps based on a finite level of improvement (i.e. A/C operation will always use some energy, fuel or electric power) that is achievable. These caps or limits to improvements in A/C efficiency were considered when establishing the GHG standards. Had the Agency believed that

⁵ See 40 CFR 86.1868-12.

improvements beyond the menu were possible, the caps may have been different and the level of the final GHG standard may have been set to a different stringency level. While we still believe that the opportunity for improvements has a theoretical limit, we understand that technologies may exist outside of the A/C credit menu that go beyond the current cap limits and that provide real-world CO₂ reductions.

Since both the total impact of the A/C system on CO₂ used to establish the GHG standards was premised on some nominal car and truck levels not specific to any vehicle, it is difficult to use the test results on any individual technology to determine what a new cap or limit should be, since the A/C system operates with interactions across all A/C components and parts of the system. This is consistent with Ford's identification of system interactions with the Denso SAS and Valeo VBV compressors and the A/C menu technologies. The Agency believes a reasonable balance may be to continue to use the nominal values for the total impact of the A/C system (11.9 grams per mile for cars and 17.2 grams per mile for truck), but then use AC17 test results to establish a higher cap or limit on the additional technologies beyond the menu technologies. The results of the AC17 test could be used to establish a ratio of CO₂ emissions or energy used with the technology improvements to total A/C usage without the technologies. This ratio could then be used with the previously established values mentioned above for the average car or truck A/C usage impacts to establish a new, A/C system-specific, cap that accounts for

the actual A/C-related emissions of the system and all the A/C efficiency technologies. This is a conceptual framework that manufacturers might use to support off-cycle petitions for A/C system credits. The Agency requests comment on this or similar approaches that make use of the AC17 test procedure to demonstrate A/C-related credits and determine an expanded cap on credits. EPA continues to evaluate Ford's rationale and will make a final decision after evaluating any public comments received on this issue.

B. High-Efficiency Alternators

Using the alternative methodology approach discussed above, Honda and Nissan are applying for credits for model years 2017 and later for off-cycle credits using the alternative demonstration methodology pathway for high-efficiency alternators. Automotive alternators convert mechanical energy from a combustion engine into electrical energy that can be used to power a vehicle's electrical systems. Alternators inherently place a load on the engine, which results in increased fuel consumption and CO₂ emissions. High efficiency alternators use new technologies to reduce the overall load on the engine yet continue to meet the electrical demands of the vehicle systems, resulting in lower fuel consumption and lower CO₂ emissions. Some comments on EPA's proposed rule for GHG standards for the 2016-2025 model years suggested that EPA provide a credit for high-efficiency alternators on the pre-defined list in the regulations. While EPA agreed that high-efficiency alternators can reduce electrical load and reduce fuel consumption, and that these impacts are not seen on the emission test procedures because accessories that use electricity are turned off, EPA noted the difficulty in defining a one-size-fits-all credit due to lack of data. Since then, however a methodology

has been developed that scales credits based on the efficiency of the alternator; alternators with efficiency (as measured using an accepted industry standard procedure) above a baseline value could get credits. EPA has previously approved credits for high-efficiency alternators using this methodology for Ford Motor Company, General Motors Corporation, Fiat Chrysler Automobiles, Hyundai, Kia, and Toyota Motor Company. Details of the testing and analysis can be found in the manufacturer's applications.

III. EPA Decision Process

EPA has reviewed the applications for completeness and is now making the applications available for public review and comment as required by the regulations. The off-cycle credit applications submitted by the manufacturer (with confidential business information redacted) have been placed in the public docket (see ADDRESSES section above) and on EPA's web site at <https://www.epa.gov/vehicle-and-engine-certification/compliance-information-light-duty-greenhouse-gas-ghg-standards>.

EPA is providing a 30-day comment period on the applications for off-cycle credits described in this notice, as specified by the regulations. The manufacturers may submit a written rebuttal of comments for EPA's consideration, or may revise an application in response to comments. After reviewing any public comments and any rebuttal of comments submitted by manufacturers, EPA will make a final decision regarding the credit requests. EPA will make its decision available to the public by placing a decision document (or multiple decision documents) in the docket and on EPA's web site at the same manufacturer-specific pages shown above. While the broad

methodologies used by these manufacturers could potentially be used for other vehicles and by other manufacturers, the vehicle specific data needed to demonstrate the off-cycle emissions reductions would likely be different. In such cases, a new application would be required, including an opportunity for public comment.

Dated: January 27, 2020.

Byron J. Bunker,

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